


## Article

# Influence of Determinants on Innovations in Small KIBS Firms in the Czech Republic before COVID-19

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Received: 26 August 2020; Accepted: 21 September 2020; Published: 23 September 2020



**Abstract:** There is still a lack of empirical evidence prevalent about innovation in knowledge-intensive business services (KIBS), and more particular, about determinants of innovations in small firms to sustain their future development. Studies in this area suggest that different determinants will affect different forms of innovation outputs of KIBS. This paper investigates the direction and the significance of these influences on propensity to innovate. The empirical evidence is based on quantitative and firm-level data gathered through an email questionnaire, which yielded 128 qualified responses from small KIBS in the Czech Republic. The analysis is based on binary logistic regression to identify the effects of determinants on the propensity to innovate. In addition to the consistent results produced by studies in this area, we found reverse relationships between innovation and selected determinants. Negatively evolving knowledge (especially lack of qualified employees) and market determinants (lack of information about the market), positively stimulated small KIBS towards the propensity to introduce organizational innovations (structural and human resources practices), followed by increasing intensity of competition positively related to introducing a new service to the firm (especially t-KIBS) and insufficient availability of business partners increasing the marketing efforts. It's evident that some negatively evolving determinants perform as incentives or driving forces to specific types of innovations. The results of this study could also be useful for owners and managers in KIBS firms engaging in innovation activities and government support, or incentivize the propensity to innovate.

**Keywords:** knowledge-intensive business services; determinants of innovations; small business; regression; survey; sustainable development

## 1. Introduction

There is a growing body of empirical literature available on success/failure factors or determinants which hamper or incentivize the propensity to innovate in cross-sectional comparison with services or knowledge-intensive business services (KIBS) [1–5], and to lesser extent in the small business area [6–8]. Many authors in KIBS area research generally hypothesize that different forms of innovation outputs will be influenced by different types of determinants [1–5,8,9]. For example, Amara et al. [1] found that financial obstacles are negatively related to product and process innovations, while knowledge obstacles tend to be negatively associated with the delivery and managerial innovations in the sample of Canadian KIBS firms. Study of KIBS firms in Palestine by Morrar and Abdelhadi [8] considered that financial factors have negative impacts on the product and process of innovation as well as the organizational and marketing innovation, followed by the demand factor, which was reflected by the weak competition and uncertainty. On the other hand, they found that the knowledge factor had a positive impact on several firms that focus on organizational and marketing innovation. More recently, Chichkanov et al. [9] provided research results, in an emerging economy such as Russia

(based on major cities), suggesting that KIBS firms experiencing negative market and knowledge conditions are more liable to undertake non-technological innovations.

The emphasis of this study is predominantly on small firms. First, the share of small and medium enterprises (SMEs) in the total number of active business entities is more than 90%, and it's clear that SMEs play a major role in the structure of all companies in economies (including the Czech Republic—99.83% in 2019). Second, in KIBS firms, there are many small-sized firms with high intensity in innovation projects [4,8]. However, innovation in small KIBS firms is still an under-researched area [6,7]. This is surprising, since small firms are recognized for having particularly different innovation behavior when compared to large firms [6,7]. Segarra-Blasco [4] documented that small firms present higher barriers to innovation than their larger counterparts, especially in two items related to cost barriers, lack of internal funds, and high cost of innovation. Furthermore, the barriers related to the market are more important in small firms than in innovative firms. In conclusion, small and innovative firms present the highest barriers to innovation overall. A research paper of small KIS firms executed by Vermeulen et al. [7] in the Netherlands, found that external networks did not appear to be a factor that increases the likelihood of new product introductions. The introduction of new products (services) first and foremost depends on market research information. They suspect the role of employees may be less pronounced in more radical innovations because such (discontinuous) innovations may often be initiated and implemented by the managing partners of the small firms. It could be expected, that KIBS are learning and cooperate with (larger) sophisticated clients, and innovating as a result [9]. However, there is still a lack of empirical evidence prevalent about innovation in KIBS firms as a heterogeneous category of services, and more particularly, about determinants of innovations in small-sized KIBS to sustain their advantage and future development. Based on the research results of previous papers, we are giving rise to the following research question: How do different determinants influence the propensity of small KIBS to innovate in the Czech Republic? This paper aims to investigate whether the selected determinants influence innovation activity and in which directions. Specifically, this study empirically explores the effect of financial, knowledge, and market determinants to the introduction of technological and non-technological innovations in KIBS firms. The contrasting results of conducted empirical papers from Western and emerging countries are interesting, and therefore research conducted in Central Europe, specifically in the Czech Republic as a post-communist country, may contribute another insight in the intensity of innovations and determinants which hamper or drive the propensity of KIBS companies in a specific national context.

The Czech Republic is in a situation where the main driver of the economy is industrial specialization, which is also linked to several business services. Despite the Czech economy gradually shifting towards more knowledge-intensive activities also thanks to EU funding, the proportion of innovative Czech firms is lagging behind the EU average [10]. The total percentage of the employment of knowledge-intensive services in Czechia increased from 31.8% in 2010 to 33.5% in 2019, growing at an average annual rate of 0.59%. In the EU, knowledge-based industries make up to 40% of total employment on average, and 33% in the Czech Republic [11]. One of the positive examples of KIBS in the Czech Republic is IT and software services, where the importance of the economy and export performance is increasing [12]. The IT sector especially has contributed significantly to the economic transformation of formerly industrial cities [13]. In the information and communication technology (ICT) activities sector providing products and services (during the year 2016–2018), 51% of services introduced products and 56% in process innovation [12]. The growing potential also shows advertising [13], digital marketing, and the creative sector such as graphical or web design. According to the latest analyses of the Czech Statistical Office [12], in the period from 2016 to 2018, the sector of scientific and technical activities perceived obstacles in the area of lack of internal funds 14.7% (M 70–73), while the sector of information and communication activities (J 53–63) perceived shortcomings especially in the area of availability of qualified labor force 24.8%.

The successful development of small KIBS companies can be seen as a prerequisite for further sustainable development of the national and export economy in the Czech Republic. Research results

are important for further insight into the intensity and type of innovations in small KIBS and the determinants that affect them to better explain why some firms either do not innovate or do not engage more intensively in innovations [1]. Further, the results of this study could be also useful for owners, CEOs, and managers in KIBS firms engaging in innovation activities, and government efforts to mitigate external factors hindering small business innovation; and better support of innovation systems. Thus, improving understanding of obstacles to innovation is important for theoretical and policy purposes [1,14]. This paper is divided as follows: The first section introduces the theoretical framework with the focus on the KIBS sector, and the subsequent methodology provides the details of data collection and analytical methods, the fourth section presents the findings of the analyses, and the final section summarizes the conclusions of study results.

## 2. Literature Review on Innovations and Their Determinants in KIBS Firms

There are different approaches to defining KIBS (see e.g., [10]) and their classification or characteristics are still sought and not yet established. However, this type of service is characterized by the private sector of small enterprises with a high level of knowledge and orientation of their services to other private or public organizations that are predominantly non-routine [15]. KIBS is not just the major segment that is a facilitator of knowledge, external information, and an innovation facilitator for other client businesses [15], but also are innovators themselves [16]. The literature and researchers try to perform analyses and comparisons based on nomenclature classification (NACE) or the prior distinction between professional (p-KIBS) such as business and management services, legal and accounting activities, market research, etc., and technical t-KIBS such as IT related services, engineering, R&D consulting, etc., as first proposed by [17]. Over the last decade, the economic and business literature has been largely discussing competitive strategies and innovation patterns in KIBS, both from a theoretical perspective and, to a lesser extent, from an empirical point of view [18–23]. However, there is still a gap in the literature concerning the determinants that foster and impede innovation in KIBS firms [1,4,6,9]. The following text is meaningfully divided first into the nature of innovations in KIBS companies and then linked to selected determinants that affect them.

### 2.1. The Multifaced Forms of Innovations in KIBS Firms

It is generally accepted that product and process innovations represent technological forms of innovation, while marketing and managerial innovation represent non-technological forms of innovations that largely overlap with organizational innovations since they represent their various dimensions [1,6,9]. Like previous studies [1,4,6,9], we therefore accept the synthesis approach to innovations in services. Product (service) innovation plays a crucial role in KIBS' operations [21,24], especially in technology-oriented KIBS, even though they are generally more likely to entail and be oriented towards organizational change [18]. Avlonitis et al. [19] suggest that this group of innovations is developed to meet or outstand the offerings of the company's competitors. The new product development literature classifies innovation into different types and captures the intensity of firms' innovation efforts within a technological domain. One of the key criteria which have been used as the basis for establishing the typologies is the degree of the radicalness (discontinuity) of innovation. However, many of the authors are using their methodology based on continuity rather than just newness; Avlonitis et al. [19], Oslo Manual for evaluating service innovations [25], Lafuente et al. [21], or perceived micro-level data from Community Innovation Survey [19,26,27]. Generally, continuous attention on renewal and innovations stimulates KIBS for action, resulting in better innovative outcomes such as new product (service) introductions [7].

According to Corrocher et al. [20], a technology adoption source of knowledge is explained by the (ICT) technologies used in the service production and delivery process. The development of technology has implications, which concerns the modes and timing of production and makes delivery of some types of services much more possible and easier. This process can introduce some distance between service development and utilization. This group of variables characterizes firms that are at the frontier

in terms of adoption and use of new technologies, but that are also likely to rely upon external drivers of innovation, such as specialized suppliers of tangible technological inputs. Technology innovation emphasizes the newness of the service's operating/delivery process (i.e., hardware, software) to the company, the technological newness of the service's delivery process and its subsequent newness to the customer, and the newness of the new service development and marketing process to the company [27]. This theoretical evidence suggests that technology development reflecting companies' orientation towards product innovation and improvement of service's operating/delivery process [28,29].

Marketing innovations involving in new or significant improvement in strategy and tactical actions such as design, placement, promotion, pricing activities changes in sales or distribution methods, advertising, or permanent exhibitions [30] (we excluded the packaging and we replaced it with a brand due to the specific feature of services). The objective is to increase the appeal for the firms' products in terms of market penetration and/or to enter new markets [28]. These actions focus on customer's needs, opening new markets, or repositioning a company's product with the intent to increase sales. KIBS managers/owners are tasked with using various communication levels to determine which consumer populations are most likely to talk about a company brand to help influence quantifiable ways to sales and profitability [31]. The issue of customer retention is also extremely important, because the ability to retain customers in a highly competitive environment often plays a crucial role, especially for the SME category, which constantly delivers services to larger and individual business clients.

A specific feature of KIBS is its labor-intensive nature. It is especially in KIBS that highly qualified human capital represents a key strategic asset. Corrocher et al. [20] talking about the organizational changes and non-technological innovations, which is explained by human capital competencies and organizational structure, and reflects an innovative pattern that is oriented towards changing organizational variables such as the firm internal structure and personnel skills and profiles. Perhaps one of the best arguments for the sustainable development of SMEs is the potential to attract and retain employees [31,32]. Development of human resource management is a critical innovation strategy, particularly for high-tech or knowledge-intensive firms. Human development strategies reflected the strategic importance placed on recruiting knowledgeable employees, training existing ones, and developing functionally diverse teams [25].

However, despite a high level of innovation activity the KIBS sector demonstrates in some of the research results [33], many of these firms do not adopt any form of innovation. Some of these firms may have little incentive to innovate. They are in comfortable niches with little competition [9], or sometimes they are primarily engaged in rather basic technology or knowledge transfer and, perhaps, in some minor customization activity for standard products to meet specific client needs [34]. The non-innovatory category of KIBS do not carry out any relevant activity and probably rely upon established reputation and/or economic upturn in terms of growing customer demand to compete in the market. This type of non-innovative KIBS has been identified throughout European studies and studies from emerging economies (see [9,20,34]).

## 2.2. Explanation of Determinants in Connection with KIBS Innovation Activities

Determinants to innovation are usually thought of by owners, CEOs, or managers of firms as external and internal factors which either negatively or positively influence their decision to innovate [1,4,8,9]. External determinants to innovations are, for example, availability of an external source of financing innovation activity, cost of innovation, pay-back period, access to technological information or skilled personnel to the labor market, and when there are factors related the market conditions such as customer demand, market structure, and size, etc. [1,4]. Internal determinants are those factors over which the firm has control or are related to the firm's abilities [8], such as of availability of internal funds, willingness to take risks, internal costs of innovation, awareness, capabilities to implement internal changes in their managerial and organizational practices, for example, the level of firm's internal skilled personnel, management training in innovation management, and cultural

rigidness to change [1,4,8]. For example, D'Este et al. [2] conclude that the success of innovation efforts depends on a firm's ability to combine capabilities such as financing, recruitment, and training of high-skill employee staff, understanding of market needs, among other factors. Whether obstacles or capabilities, the characteristics and operating conditions of companies affect their decisions as to whether to proceed with innovation activities and which activities to undertake [9]. We fully respect the importance of internal determinants influencing the decision to innovate, especially in the category of SME-sized companies [6,7], yet this study builds primarily on the combinations of selected determinants defined by authors [1,4,6,9] to distinguish between three groups of determinants to innovation, namely: Financial, knowledge, and market determinants. Following researchers in this area [1,4,8,9], we hypothesize:

**Hypothesis 1 (H1).** *Different forms of innovation outputs introduced by small KIBS in the Czech Republic will be influenced by different types of determinants (i.e., financial, knowledge, and market determinants).*

### 2.2.1. Financial Determinants Influencing Innovation Propensity of KIBS Firms

Studies focusing on obstacles or barriers encountered by KIBS firms stress the importance of financial obstacles as a factor that is negatively associated with product and process innovations [1,4,6,9]. The first group of factors within financial determinants is associated with the cost of financing. Cost factors are also liable to be highly important for small enterprises, where innovators among KIBS may face strong challenges [9]. For example, innovation efforts require specific expenditures, some of which can be very costly for the company, especially when they decide to generate new knowledge through R&D projects [8]. This is more typical for large firms, while SMEs apply new knowledge through practice and experience utilizing the learning-by-doing process [8]. The input measures of innovations, which rely on indicators based on R&D expenditure or R&D-personnel, do not adequately capture the innovative effort by small firms [35]. KIBS companies frequently lack specialized R&D departments and place much emphasis on the role of human capital [34]. KIBS firms require more highly qualified employees who can command relatively high wages [9]. Additionally, the investment in human resources appears to increase, rather than decrease, with the introduction of more radical innovation and ICT, following the need for firms to improve their knowledge capacity [20].

The second, often mentioned factor is access to external financing. It may be difficult for small firms to find such internal financial resources for innovation, due to lack of funds within the enterprise and limited access to funding from outside sources like venture capital and public funding [9]. Besides, small firms seem to be more sensitive to access to public funding [4]. Insufficient support and a system of external financing can thus be a significant obstacle for small KIBS firms to produce more knowledge-intensive solutions based on the technology domain. The last-mentioned factor in this category is the company's turnover as a source of financing. It is generally argued that a decline in a company's turnover hinders all forms of innovation [9]. However, studies like [1] assume that developing service, process, and marketing innovations are more likely to rely on the use of external capital than structural and management processes in human resources, which are more likely to rely on the use of internal resources. The study by Chichkanov et al. [9] partially confirms that KIBS companies with decreasing turnover tend to significantly less frequently introduce marketing innovation than other forms. Based on the previous studies, we hypothesize the following:

**Hypothesis 2 (H2).** *Increasing costs of financing innovations are likely to negatively influence the propensity to innovate in service, process, and marketing innovations.*

**Hypothesis 3 (H3).** *Lack of access to external financing is likely to negatively influence technological innovations (i.e., service and process innovations).*

**Hypothesis 4 (H4).** *Decreasing of turnover is likely to negatively influence non-technological innovations (i.e., organizational and marketing innovations).*



### 2.2.2. Knowledge Determinants Influencing Innovation Propensity of KIBS Firms

The first factor among knowledge determinants is access to skilled employees. In KIBS sectors, innovation results from the capability to combine, in a new unique body of knowledge, tacit with codified knowledge, old with new knowledge, and internal with external knowledge [1,17]. KIBS by its nature is highly dependent on expertise and skills [9,36]. However, small firms are not able to match wages, career development opportunities, or job security available in large firms, leaving them disadvantaged in the market for highly skilled employees [7]. When the company does not have an opportunity to invest in high-skill employees, it may face what Oslo Manual [25] classifies as knowledge barriers to innovation. Lack of qualified staff was reported as a factor hindering innovation by [37,38]. Problems with the availability of high-skilled labor may be more severe in emerging countries and even if there is a good supply of university graduates, skills for KIBS may be limited [9].

Another group of knowledge determinants is access to information about market and technology. As Amara et al. [1] pointed out, innovative firms increasingly rely on these external knowledge sources as a way of accessing the knowledge available outside their boundaries. External information does not only come from research institutes or competitors, but also from customers. Firms that can understand market needs by conducting market research are likely to be more successful in innovations [7]. The last factor among knowledge determinants is access to information about technology. Likewise, firms' learning capabilities are also enhanced by the use of advanced technologies that embody codified knowledge, which creates new opportunities for experimentation and problem solving that would be otherwise impossible [1]. Following the logic of Amara et al. [1], we suggest that the propensity of KIBS to innovate is based on the ability to combine new external knowledge might be hindered by the lack of access to skilled employees, and lack of information on markets and technology. More specifically, we hypothesize the following:

**Hypothesis 5 (H5).** *A Lack of access to skilled employees is negatively related to all forms of innovations.*

**Hypothesis 6 (H6).** *A Lack of access to information about markets is negatively related to marketing innovations.*

**Hypothesis 7 (H7).** *A Lack of access to information about technologies is negatively related to process and organizational innovations (HRM practices and structural changes).*

### 2.2.3. Market Determinants Influencing Innovation Propensity of KIBS Firms

The first factor among market determinants is customer demand, identified as an important source of information for innovation behavior in KIBS firms [1,4,8]. The firm's understanding of customer demand helps in delivering a comprehensive customer experience that is relevant for creating service innovation [8]. To become successful, firms should listen to customers' demands while anticipating and developing innovative, value-added services that drive the marketplace [8]. The complex problem-solving involved in the service requires close interactions between the service supplier and the client [9]. Bolisani et al. [39] showed that less standardized service offerings require a wider knowledge base and make their producers more dependent on external relations. Another explanation is that KIBS clients may have low motivation to cooperate due to the lack of clarity about their role, or due to the lack of qualified staff and limited technical capabilities in the area of KIBS expertise [9]. Lack of demand for innovation from customers may lead to the low intensity of innovation or reluctance of KIBS companies to innovate, as evidenced by research in this area [1,4,8], and they produce more standardized services without renewal or constant modernization requirements.

Another factor refers to the intensity of competition [40,41]. Tether [18] and Freel [42] claim that innovation strategies of KIBS are much related to competitive circumstances, which represent more relevant objectives than industry classification or other characteristics. On the one hand, increased competition in KIBS sectors could create incentives to produce more innovation outputs and is positively related to service innovation [8], on the other side, intense competition is likely to negatively

influence the product, process, delivery, and marketing innovations, but does not influence strategic and managerial innovations [1]. It is evident that the relationship between market competition and innovation is not linear and simple, and while the intense competition promotes innovation, excessive rivalry could discourage change and innovation activities. [4].

Last but not least, factors refer to the business partners' conditions. The establishment of relationships with partners and a subset of organizational innovation has been developed especially for services [8,43]. Service firms are more likely to engage in collaborations with suppliers as part of their innovation process [18]. Customers, suppliers, and competitors are major sources, while partners such as professional associations are another [34]. Customer and supplier relationship development allows for maximizing the use of their limited resources [44]. The availability of these partnerships can provide them with opportunities to acquire new skills and improve existing ones. This is particularly true for small firms due to the scarcity of material resources, as small firms collaborate with other parties, which increases their innovation success rates [7]. We hypothesize the following:

**Hypothesis 8 (H8).** *A lack of customer demand is negatively related to service, process, and marketing innovations, but does not influence organizational innovations (HRM practices, structural changes).*

**Hypothesis 9 (H9).** *The increasing intensity of competition is positively related to service and marketing innovations, but does not influence organizational innovations (HRM practices, structural changes).*

**Hypothesis 10 (H10).** *The lack of availability of business partners is negatively related to service and organizational innovations (structural and HRM practices).*

### 3. Variables Definitions, Data, and Methods

#### 3.1. Variables Definition

##### 3.1.1. Innovation Outputs in KIBS Firms

We use innovation output indexes as dependent variables derived from the literature on innovation in services [1,4,9,19]. Using a five-point scale (1: Strongly disagree, 5: Strongly agree), respondents were asked to indicate their degree of agreement with each innovation area implemented in the last five years (for operationalization of depending on variables see Table 1).

We measure the service innovations divided into product innovation (newness to the firm and newness to the market) and product modification to distinguish continuous features of innovations in services Voss et al. [45]. We used proxy measures for the newness of service to the firm (NSF): (NSF<sub>1</sub>) the service was new to the company, (NSF<sub>2</sub>) the service supplemented an existing company line, (NSF<sub>3</sub>) the service created a new product line for the company; proxy measures for the newness of service to the market (NSM): (NSM<sub>1</sub>) the service was new to the market, (NSM<sub>2</sub>) the service offered new features towards competition, (NSM<sub>3</sub>) the service was in response to changing customer purchasing behavior, and finally, service modification (SM): (SM<sub>1</sub>) the service was a modification of existing services, (SM<sub>2</sub>) the service was a revision of existing services, and (SM<sub>3</sub>) existing services targeted at a new market.

Technology adoption is explained by the adoption of the ICT technologies through the new or significant improvement of hardware (HW) and software (SW) supporting product innovation, particularly delivery and operational processes [19,20,27]. We incorporated technology adoption items such as software, hardware, and other ICT technology improving production or delivery processes.

Marketing innovations involve new or significant improvement in design, placement, promotion, and pricing activities [30]. We incorporated six items, including (M<sub>1</sub>) marketing strategy—territorial markets/customer segments, (M<sub>2</sub>) company and product presentation, (M<sub>3</sub>) distribution channels, (M<sub>4</sub>) pricing policy, (M<sub>5</sub>) communication with customers, and (M<sub>6</sub>) brand of services offered.

Under organizational innovation, we incorporate structural changes as new or significantly improvement: (O<sub>1</sub>) in the area of ownership, (O<sub>2</sub>) in the area of decentralization, (O<sub>3</sub>) in a functional





### 3.1.2. Determinants of Innovations in KIBS Firms

We use determinants as independent variables, and attempt to show how the innovation activities of KIBS are affected by various categories of determinants. The literature dealing with determinants of innovations points to three main areas: Financial, market, and knowledge that may impact KIBS' innovation activity [1,4,6,8,9]. We incorporated a more dynamic intensity of perception of selected determinants when different types of innovation were introduced in recent years. Using a five-point scale, we ask the respondents about their opinions, and how they perceived selected determinants in terms of positive and negative development or evolution when innovations were introduced (For operationalization of independent variables, see Table 1).

For financial conditions, we used three variables: (COF) cost of financing, (ATF) access to financing, and (DOT) development of turnover. For the first proxy measure, cost of financing, we used the trend decrease/increase as a change in cost development spent on innovation activities during the period. The second proxy, access to external financing, used the trend improvement/deterioration as a change in the availability of external financial funds. The last proxy is the trend of development in company turnover, which is a well-known metric that is used to indicate the financial health of the company and predict the probability of bankruptcy [9]. This indicator is believed to show how well management deals with a competitive environment. We used the trend to decrease/increase as a change in turnover or sales revenues [9]. We assume that developing product, process, and marketing innovations are more likely to rely on the use of external capital than organizational innovations, which are more likely to rely on the use of internal resources.

The knowledge conditions are concerned with three variables: (ASE) access to skilled employees, (AIM) access to information on the market, and (AIT) access information on technology [1,4]. For the first one, access to skilled employees, we used the trend (improvement/deterioration) as a change in the availability of external skilled employees. For the second variable, access to information on the market, used the trend improvement/deterioration as a change in available information about the situation on the market. For the last variable, access information on technology, we used the trend (improvement/ deterioration) as a change in knowledge about new advanced technologies. We suggest that the propensity of KIBS to innovate is based on the ability to combine new knowledge that might be hampered by the lack of access to skilled employees, lack of information on markets, and lack of information on technologies [1].

The market conditions are addressed in the survey through three variables: (DOC) the demand of customers, (IOC) the intensity of competition, and (AOP) availability of business partners. For the first proxy, demand and customer expectation, we used the trend improvement/deterioration as a change in demand for innovations from clients. For the intensity of competition, we used the trend (improvement/deterioration) as a change in intensity competitors to the market. The suppliers and business partner's conditions are addressed in the survey, through a question about the availability of cooperation with suppliers and other business partners. According to prior studies [4,46], the barriers could be generated by the difficulties of KIBS when finding the qualified partners (collaborating companies, research public centers, technological transfers centers, universities, etc.) and seem to be the most important factors affecting innovation in KIBS firms [4,47].

We also include a set of control variables into the survey following factors that other studies have related to innovation [22], namely age [8,48], industry characteristics [1,4,9], and the level of standardization of service activities [9]. Suspecting that the effect of standardization could have a non-linear effect (too little and too much customization both diminishing innovative potential). Industrial differences were measured by using dummies for different types of KIBS because companies innovate in various ways and the sector displays high heterogeneity, but previous studies suggest that the groups of p-KIBS and t- KIBS are useful for analysis [9,17].

### 3.2. Data and Descriptive Statistics

#### 3.2.1. Data and Research Sample

Drawing on the survey on a firm-level dataset, this study aims to investigate how different determinants influence the innovation outputs in the small KIBS sector from the Czech Republic. The research was conducted in the pre-crisis period of the Covid-19 based on quantitative data through an email questionnaire from July to September 2017. The basic population gathered from the university database Amadeus after selection criteria (headquarters in the Czech Republic, only private profit sector; services operating more than 5 years, should not be a presumption of bankruptcy or insolvency; the total number of employees is 10–49; the owner is a senior executive (CEO), and must be in the top management and has majority share 50.1%) included 1214 companies operating in the KIBS sector. The total return rate from the survey was 128 valid answers in completely and correctly filled forms (return 10.5%). The resulting sample of respondents copies the theoretical database file structure (see Table 2). Look at the basic characteristics such as age, sector, and type of services offered, our sample includes companies operating 10 to 20 years (46.1%), more than 21 years on the market (43.8%), and from 6 to 9 years (10.2%). The sample represents companies with history, built-in knowledge and experience, and relative market share, but remain small in size. The terms representation of companies ( $N = 128$ ) according to the examined basic sectors are most represented by t-KIBS (65.6%). KIBS together are characterized by offering customized services with standardized modules with a higher level of adaptation (47.7%) or fully customized services (37.5%), supporting that KIBS are oriented to the requirements of clients.

**Table 2.** KIBS classification of industrial activities according to CZ-NACE Rev. 2.

CZ-NACE	Theoretical Frequencies		Research Frequencies		Type of KIBS
	Absolute	Relative	Absolute	Relative	
Section J	62	300	24.71%	37	28.91%
	63	21	1.73%	3	2.34%
Section M	69	214	17.63%	19	14.84%
	70	64	5.27%	7	5.47%
	71	407	33.53%	40	31.25%
	72	17	1.40%	4	3.13%
	73	123	10.13%	11	8.59%
	74	68	5.60%	7	5.47%
Total	1214	100 %	128	100 %	-

#### 3.2.2. Descriptive Statistics of Innovations and Their Determinants

Table 3 presents the distribution of KIBS firms concerning the different types of innovation. Out of the total ( $N = 128$ ) KIBS, we identified that 31% do not innovate (closer analysis of perception and comparison with innovative KIBS is outside the scope of this work). From innovative firms, each company might introduce different types of innovation simultaneously, so the sum of the number of companies introducing different types of innovations exceeds the number of innovative companies. The sample contains a total of almost 69 % of KIBS companies that can be considered as innovators (see Table 3). At the general level, the most innovative extreme continuum in terms of introducing completely new services to the market with a significant impact on customer behavior has not occurred in small Czech KIBS firms at all. The possible explanation is that breakthrough innovation is very costly and risky for small businesses, and during the economic upturn in the period 2013–2017, the range of services offered was probably more important than introducing new services to the market [12]. The second possible explanation is that the range of services offered appears to be more important than introducing new services to the market [9]. It is plausible that KIBS firms that are experiencing growing customer demand or economic upturn are not encouraged to engage in innovation or new marketing efforts [34].

**Table 3.** Descriptive statistics of innovations in KIBS firms.

Depend on Variable: Types of Innovations	Description: The Firm Implemented or Introduced	t-KIBS	p-KIBS	% within Types of Innovations Equal to 1 (N = 128)
Technology innovations				
Service modification	Any modified, revisited, or repositioning of existing services to new markets	32.1%	45.5%	36.7% (47)
Service innovation <sup>a</sup>	Any new services to the firm, supplementary or line extension to current services	40.5%	27.3%	35.9% (46)
Process innovation	Any new or significant modified of hardware (HW), software (SW), or ICT improving production or delivery processes	20.2%	18.2%	19.5% (25)
Non-technological innovations				
HRM practices	Any new or significant modified HRM practices	29.8%	18.2%	25.8% (33)
Marketing practices	Any new or significant modified marketing practices	23.8%	11.4%	19.5% (25)
Structural changes	Any new or significant modified structural changes	11.9%	25.0%	16.4% (21)
Innovative KIBS	Any type of above-mentioned innovations	71.4%	63.6%	68.8% (88)

<sup>a</sup> Proxy measure by newness to the market innovation was excluded from the sample.

In terms of a priori division of sectors, the t-KIBS dominate in producing of service innovations (newness to the firm) than p-KIBS, especially the sector of information service activities. On another side, p-KIBS introduced the more evolutionary nature of services in terms of modification, revision, and repositioning of activities. However, an important finding is that t-KIBS are not only focused on technological innovations, but to a large extent can generate non-technological innovations. In contrast, p-KIBS has more often implemented changes and modifications in the area of organizational structure and positions or profiles of employees. Compared to t-KIBS, of course, the implementation of new or modified ICT technologies supporting production and delivery processes by p-KIBS is at a lower level, but this difference is not so significant.

The descriptive statistics of the different types of determinants of innovation are presented in Table 4. The results partially support the results of the survey by the Czech Statistical Office [12], where information and communication services perceive the availability of qualified staff as a negative trend rather than internal financing costs. For p-KIBS, the lack of internal finance and the availability of skilled labor are roughly at the same level. Interestingly, t-KIBS perceives the market environment as highly competitive with increasing competition in contrast to p-KIBS. On the other hand, p-KIBS perceive the lack of customer demand for innovation and access to information about the market as negatively evolving, unlike t-KIBS.

Overall, the most frequently determinant as negative trend perceived by the KIBS category is the area of customer demand (35.2%), availability of qualified employees on the market (35.1%), and increasing costs of financing innovation activities (30.5%). Given that these are small KIBS companies, it is surprising that they generally perceive market and knowledge conditions more frequently as negatively evolving than financial determinants. One possible explanation is that small firms and services are more sensitive to market conditions as evidenced by the results of empirical research for example [4]. KIBS almost exclusively consists of transferring knowledge and skills to client's organizations and thus, contrary to manufacturing firms, KIBS innovation capabilities are likely to be less hampered by financial obstacles than by knowledge obstacles [1,8]. Another explanation is that our sample contains KIBS companies with longer histories, the built relative market share ensuring the inflow of funds from (permanent) clients/long-term projects, or a built network to raise external capital. In terms of intensity, the determinants of perception are at the same and medium level. However, access to external financing seems to be a less important problem perceived by KIBS than other factors.

**Table 4.** Determinants of innovations in KIBS firms.

Independent Variables: Determinants	Intensity (Scale) of Perception *					Mean	Median	% within Types Equal to 1		
	1	2	3	4	5			t- KIBS	p- KIBS	Total (N = 128)
Financial determinants										
Cost of financing	0.0	30.5	45.3	21.1	3.1	2.9688	3.000	25.5%	35.5%	30.5%
Access to financing	3.9	18.0	25.8	37.5	14.8	3.41	4.000	21.4%	22.7%	21.9%
Development of turnover	0.0	21.1	35.9	38.3	4.7	3.2656	3.000	21.6%	22.2%	21.1%
Knowledge determinants										
Access to skilled employees	14.8	20.3	28.1	29.7	7.0	2.94	3.000	38.6%	33.3%	35.1%
Access to information on markets	0.0	22.7	31.3	37.5	8.6	3.32	3.000	19.0%	29.5%	22.7%
Access to information on technology	3.1	10.9	53.9	26.6	5.5	3.2031	3.000	16.7%	9.1%	14.1%
Market determinants										
The demand from customers	11.7	23.4	37.5	27.3	11.7	2.8047	3.000	31.0%	43.2%	35.2%
The intensity of competition	3.9	25.8	54.7	10.9	4.7	2.8672	3.000	40.9%	23.8%	29.7%
Availability of suppliers and business partners	0.0	22.7	59.4	18.0	0.0	2.9531	3.000	23.8%	20.5%	22.7%

\* For operationalization of intensity scale see Table 1.

### 3.3. Analytical Regression Model

The analytical method used to investigate the influence of determinants to innovation activities of KIBS or probability to innovate, we estimated a logit binary model if the innovative status is adopted in the period of the last 5 years. The innovation output indexes were transformed into dichotomous variables (0, 1)—either the KIBS introduced/implemented innovation or not. If the company implemented at least one type of innovation, this company is considered as innovative. The reference category for innovation in the model equals = 1. Further, each area of determinants (financial, knowledge, market) measured on the 5-point scale was transformed into dichotomous variables (0, 1)—either the KIBS perceived determinants as negatively evolving or not when implemented innovation activities. The reference category for negative trend equals = 1. The following model is developed to see what the determinants of the various types of innovation are, and to see, particularly, in what ways the determinants to innovation affect these types of innovation:

$$\log \frac{\pi(x)}{1-\pi(x)} = \alpha + \beta_1 COF + \beta_2 ATF + \beta_3 DOT + \beta_4 ASE + \beta_5 AIM + \beta_6 AIT + \beta_7 DOC + \beta_8 IOC + \beta_9 AOP + \beta_{10} AGE + \beta_{11} SOS + \beta_{12} INDUSTRY + \varepsilon_i \quad (1)$$

where  $\log \frac{\pi(x)}{1-\pi(x)}$  is the logarithm of the ratio of the probability that a KIBS firm introduces an innovation of a particular type to the probability that it does not implement any innovation;  $\alpha$  is a constant,  $\beta_i$  ( $i = 0, 1, \dots, 13$ ) are regression coefficients,  $COF$ ,  $ATF$ ,  $DOT$  is a proxy of financial determinants;  $ASE$ ,  $AIM$ ,  $AIT$  is a proxy of knowledge determinants;  $DOC$ ,  $IOC$ ,  $AOP$  is a proxy of market factors;  $AGE$ ,  $SOS$ ,  $INDUSTRY$  (p-KIBS, t-KIBS) is a proxy of control variables;  $\varepsilon$  is an error term.

## 4. Regression Results

The regression results of the logit models are summarized in Table 5 in terms of estimated effects and standard errors for technology and non-technology innovations. We use IBM SPSS software to apply binary logistic regression and GENLIN command to estimate the model. The explanatory power of all models is quite high with 12 degrees of freedom at the 5% level, such as indicated by the percentages of correct predictions, which is also good. It varies between 63.3% for the modifications and 83.60% for the structural changes model. Finally, the Nagelkerke pseudo R<sup>2</sup> is quite acceptable for models with qualitative dependent variables. It varies between 0.199 for the process innovation's model and 0.436 for the service innovation's model.

**Table 5.** The results of estimated logit regression <sup>a</sup>.

Description of Variables	Service Modification	Service Innovation	Process Innovation	Structural Changes	HRM Practices	Marketing Practices
Intercept (Coeff. $\beta$ )	6.966 **	2.856 **	5.895 **	5.077 **	4.213 **	1.123 **
Financial determinants						
Cost of financing	−0.821 * −0.437	−0.915 ** −0.567	−0.659 * −0.645	0.579 −0.645	−0.099 −0.546	−0.062 −0.547
Access to financing	−0.351 −0.521	−1.644 *** −0.736	−0.27 −0.771	−2.076 ** −1.024	−1.952* −0.889	−0.383 −0.681
Development of turnover	−0.153 ** −0.496	−1.115 −0.677	0.420* −0.669	−0.365 * −0.72	−0.887 −0.666	−0.184 ** −0.605
Knowledge determinants						
Access to skilled employees	−0.586 −0.447	−0.150 ** −0.512	0.249 −0.562	0.644 ** −0.654	0.779 ** −0.506	−0.577 −0.505
Access to information on markets	0.454 −0.513	−0.286 * −0.629	0.345 −0.620	1.643** −0.762	0.783 * −0.63	−0.112 ** −0.645
Access to information on technology	0.008 −0.545	0.096 −0.671	−0.657 * −0.853	0.584 −0.794	0.333 ** −0.679	−0.578 −0.619
Market determinants						
The customer demand	−0.055 ** −0.448	−0.094 * −0.576	−0.870 * −0.694	0.657 −0.626	−0.654 * −0.6	0.254 −0.583
The intensity of competition	−0.19 −0.419	0.897 ** −0.517	−0.535 −0.608	0.178 −0.579	−0.342 −0.541	−0.176 * −0.547
Availability of suppliers and other partners	−0.068 −0.483	−0.099 ** −0.271	−1.848 ** −1.081	−0.612 −0.776	−0.087 −0.646	0.555 * −0.569
Control variables						
Age	0.21 −0.565	−1.009 ** −0.271	0.131 −0.252	−0.907 ** −0.305	−0.413 −0.233	0.02 −0.334
Industry	−0.659 * −0.44	1.272 * −0.549	−0.011 −0.551	−0.664 −0.558	0.765 −0.539	0.639 −0.887
Standardization of services	−0.387 ** −0.466	−0.664 * −0.382	−0.164 −0.357	0.226 −0.558	−0.806 ** −0.346	0.084 −0.486
Pseudo R-square Nagelkerke ( $R^2$ )	0.208	0.436	0.199	0.287	0.29	0.198
Hosmer-Lemeshow statistic's significance	0.199	0.325	0.601	0.765	0.693	0.296
Percentage of correct predictions	63.30%	64.10%	70.50%	83.60%	74.20%	80.50%

Based on  $\beta$  coefficients and standard errors of estimates are in parentheses. The coefficient is significant at the \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

According to the results presented in Table 5, all of the determinants considered are found to influence innovation activities in KIBS firms. However, the direction and significance of these effects differ between innovation types. The results show that KIBS firms are less likely to develop new services when they perceived that their innovation activities are threatened by increasing costs of financing and deterioration of access to external financing. As for the likelihood that KIBS firms develop new service innovation, it decreases when they perceive significant or highly increasing costs of financing innovation activities, significant or high deterioration of access to external funds, lack of access to skilled employees, and availability of business partners as negatively evolving. On the contrary, with the increasing intensity of competition in the market, the production of new services increases. The likelihood that KIBS firms introduce service modification decreases when they perceive decreasing turnover, increasing cost of financing, and decreasing customer demand. KIBS firms are less likely to develop process innovation when they perceive the cost of financing, lack of information on technologies, customer demand, and availability of business partners as obstacles. A surprising and



different finding from other research is the relationship of financial determinants with organizational determinants, specifically structural activities and access to external funding. KIBS firms are less likely to develop structural innovations when they perceive that activities are threatened by significant or high deterioration access to external funds or decreasing turnover. However, the structural innovations increase when KIBS perceive negative conditions about the access to skilled employees and access to information about the markets. This may indicate a reverse relationship, that negative market conditions positively stimulate KIBS activities towards structural innovations. We identified essentially the same effect in HRM practices. However, while the availability of market information is important in the context of knowledge determinants for structural change, it is the availability of technical information for HRM practices. Further, with decreasing turnover, lack of access to information about the market, and increasing intensity of competition, KIBS firms are less likely to develop marketing innovations. On the contrary, the deterioration of access to potential business partners results in increased marketing activities.

Among control variables, we found a significant relationship between standardization and innovation outputs. More precisely, as the degree of standardized services offered increase, the share of produced service innovations/modifications and HRM practices decrease. The heterogeneity of KIBS across a priory typology also influences some types of innovation. The more technological KIBS are, the higher the share of production of service innovations and, conversely, the less KIBS falls into the category of technological companies, the more produce service modifications. Finally, we found that the business age of the KIBS firms is negatively related to service innovation and structural changes. In other words, with increasing age, the propensity of companies to generate service innovations and innovate organizational structure decreases.

## 5. Discussion

The results of this study support some of the research results in this area as well as contrasting findings due to the limited national context. With the contrast to research results in this area (e.g., [1,4,6,8,9]) we found, that t-KIBS are not only focused on the production of technological innovations, but they have the propensity to implement non-technological innovation, i.e., marketing and organizational. We found that different determinants will affect different forms of innovation outputs of small KIBS firms, which is in line with previous research results in this area (e.g., [1,4,6,9]). Hypothesis 1 (H1) is thus supported. We found that the firms experiencing negative market and knowledge conditions are more liable to undertake non-technological innovations. The propensity to innovate in some cases is caused mainly by the reaction of small KIBS companies to the negative conditions in selected factors.

### 5.1. Financial Determinants

In this study, we assumed that developing service, process, and marketing innovations are more likely to rely on the use of external capital, and organizational innovations are more likely to rely on the use of internal resources. We have found that this is not entirely according to prior studies [1]. It seems that small KIBS companies finance modifications, revisions, repositioning current services, and marketing activities from internal sources. Service modifications are produced mainly by p-KIBS and probably do not require higher costs (in terms of slight renewal) against t-KIBS producing new services to the firm threatened by higher costs of financing, and therefore also the inevitable access to external financing. We found that increasing costs of financing negatively influence the propensity of KIBS firms to generate new services and lesser extent modifications but not marketing innovations, so the Hypothesis 2 (H2) is partially supported.

Further, we found that lack of access to external financing is likely to negatively influence the production of new services and organizational innovations (structural and HRM practices), so Hypothesis 3 (H3) is rejected. Amara et al. [1] and Chichkanov et al. [9] did not find any significant relationships between poor financial conditions and different types of organizational innovation.

However, we found the effect of access to external funding and organizational innovations. It seems that structural innovations implemented mainly category of p-KIBS are threatened by internal funds such as turnover but also access to external funds. Structural innovations could require access to external sources of financing as a result of more financially demanding strategies such as a focus on providing more comprehensive services in the form of acquisition or internationalization strategy (entry into new markets) through joint venture and other more capital-intensive forms. This finding is not well empirically documented, and requires further research in this area. Further, decreasing turnover is likely to negatively influence marketing innovations and service modifications, and to a lesser extent, organizational innovations, so Hypothesis 4 (H4) is partially supported. This is similar to the result of the study [9], that decreasing turnover has a negative effect on marketing innovations in the Russian case.

### 5.2. Knowledge Determinants

Knowledge determinants seem to be considered important by KIBS firms when they engaged in the newness of services to the firm and organizational innovations. However, the structural innovations increased when KIBS perceived negative conditions about the access to skilled employees and access to information about the markets. These findings indicate a reverse relationship, that negatively evolving knowledge determinants positively stimulate KIBS activities towards structural innovations. This is partially the same result of the study processed by Chichkanov et al. [9] in the Russian case. Chichkanov et al. [9] suggest that a lack of qualified personnel could lead firms to pay more attention to internal organization, combining existing skills and competencies in more effective ways [9]. We identified essentially the same effect in HRM practices. While the availability of skilled employees is important for both structural and HRM practices, it is the availability of information about technology which is further important.

We found that lack of access to skilled employees is negatively related to the newness of services to the firm, but not in the case of organizational innovations and nor to service modifications or marketing innovations, so Hypothesis 5 (H5) is rejected. It seems that the production of service modifications and marketing efforts of small KIBS from Czechia do not necessarily create the need to acquire new skilled workers from the external environment. One possible explanation in the small KIBS business research is the involvement of a firm's (frontline) employees in collaborative efforts to produce innovations as a driving force [6,7,9]. For long-term survival, KIBS firms directly depend on their co-workers' knowledge and individual innovative behavior, and their ability to maintain steady relationships from the experience of previous interactions with clients [6,7,9]. It is necessary to produce organizational innovations that will enable KIBS to obtain and process information about clients, the problems they encounter, and individual solutions that work for such clients from KIBS employees. [9].

A lack of access to information about markets is negatively related to marketing innovations, so Hypothesis 6 (H6) is accepted. Finally, we found that lack of access to information about technologies is negatively related to process innovations and HRM practices, but not with other organizational innovations (structural activities), so Hypothesis 7 (H7) is partially supported. For example, Corrocher et al. [20] found that technology and more service-oriented KIBS are more likely to invest in human resources. Asikainen [23] reported that innovations aiming to improve the production process need to be supported by training for employees.

### 5.3. Market Determinants

A lack of customer demand for innovation is negatively connected with the introduction of new services and modifications of existing products, process innovation, and HRM practices, but not marketing innovations, so Hypothesis 8 (H8) is partially supported. We may expect, that most of the KIBS firms denote that there is no need for innovation due to prior innovations and due to the low interest of their clients [8]. This may reflect insufficient market information to understand customer needs or an immature client's base market, where such innovations do not necessarily require

much specific knowledge. In circumstances where clients are not coproducing highly specialized solutions to their particular problems, KIBS are probably liable to move to supply more standardized services required by supporting organizational innovation, involving staff undertaking new procedures, with new management processes being associated with these [9]. After the resurgence (after the crisis period 2013–2017), probably the volume of services offered was more important [19], and this caused the propensity to innovate staffing of management, the number of new employees, and the structure itself.

With the increasing intensity of competition in the market, the production of service innovations increases, however, we didn't identify support for process and marketing innovations nor organizational, so Hypothesis 9 (H9) is rejected. There are t-KIBS produced new services to the firm who perceive the market environment as highly competitive in contrast to p-KIBS. However, we found a negative effect related to increasing competition in marketing innovations. While we might expect demand to increase when there is a larger number of companies in the environment, we could also suspect that competitive KIBS are likely to be more prevalent [9]. It is plausible that KIBS firms that are experiencing growing customer demand, in general, are not encouraged to engage in new marketing efforts [34]. Amara et al. [1] found the intensity of competition to be negatively related to marketing innovations, which corresponds with this interpretation.

A lack of availability of suppliers and other business partners (customers, research centers, etc.) is negatively connected with service and process innovations, while there is a reverse relationship with marketing innovations, so Hypothesis 10 (H10) is rejected. The establishment of relationships with suppliers and business partners and a subset of organizational innovation is important especially for services. Engage with services in collaborations with suppliers as part of their innovation process is well documented [18,34]. The availability of these partnerships can provide them with opportunities to acquire new skills and improve existing ones [2,8,18]. This is evidenced by the marketing efforts of companies in the absence of the availability of these partners. It is also confirmation that small KIBS could learn from their business partners and cooperate in the innovation process.

## 6. Conclusions

The goal of this paper was to explore the determinants that influence the innovation propensity of small KIBS firms in the Czech Republic. We distinguish three main types of determinants specified in the discussed literature: Financial, knowledge, and market, and apply logit models to data from a survey of the small size KIBS category in the Czech Republic to estimate the influence of determinants on innovations outputs. Due to the specific features of innovations in service firms, we have adopted a synthesis approach and divided innovation outputs into six types, such as service innovation (newness to the firm and market), modification (renewal activities of current services), process, marketing, human resource, and structural innovations. Generally, the research results confirm that different types of innovation are differentially affected by various types of determinants.

The Czech small KIBS generally perceive market and knowledge factors more frequently as negatively evolving than financial determinants in recent years (pre-crisis period). In addition to the consistent results produced by studies in this area, we found reverse relationships between innovation and selected determinants. Negatively evolving knowledge (especially lack of qualified employees) and market determinants (lack of information about the market) positively stimulated small KIBS towards the propensity to introduce organizational innovations (structural and HRM practices), followed by increasing intensity of competition positively related to introducing new services to the firm (especially t-KIBS) and insufficient availability of business partners increasing the marketing efforts. It's evident that some negatively evolving determinants perform as incentives or driving forces to specific types of innovations. We agree with authors Chichkanov et al. [9], that it is necessary to take into account the importance of both positive and negative conditions in future studies, and that some negative conditions may perform as incentives to specific types of innovation. In this case, the results of the activities of small KIBS companies from the Czech Republic seems to be much closer to research results

from the Eastern countries than to the Western countries. However, the results show differences due to the specific national context.

Corrocher et al. [20] suggest that the relationship between KIBS' innovation and standardization is not conclusive. On one hand, standardization should help companies increase the market size through replication as a complementary strategy for innovation [48], and on the other hand, Tether et al. [49,50] reported that specialization in services tends to be associated with higher levels of innovation, and a high level of investment in technology and service customization is a distinct feature of technical KIBS. We found some relationship between standardization and KIBS service innovation activities. The heterogeneity of KIBS across a priory typology also influences some types of innovation, however, we didn't identify strictly differences between technology and non-technology innovations implemented by t-KIBS and p-KIBS as reported some researchers [1,9].

Finally, we found that with increasing age, the willingness of companies to generate service and organizational innovations decreases. This is consistent with some of the previous studies [6,8], that younger and new firms are more able to bring innovations. Research provided by Morrar and Abdelhadi [8] found that old firms have a disadvantage in organizational innovation, which might be explained by the novelty of the KIBS sector in Palestine. De Jong and Vermeulen [6] found a negative effect of age on the new product innovations in Dutch small firms.

### 6.1. Practical Implications

From the general point of view of ownership in the Czech Republic, companies under foreign control innovate more actively than domestic companies, and the highest share of companies that innovate their products or services are large, multinational companies [12]. Domestic small KIBS companies thus face many challenges for innovation to compete with the market with their larger and foreign-owned rivals. The results of this study suggest that the owners, CEOs, and managers of small KIBS firms have to take into account that the different types of determinants hinder or drive the various forms of innovation in small KIBS firms. We offer some recommendations in this area:

- (1) The owners and managers of small KIBS companies can overcome barriers (in the form of lack of access to skilled employees and market information) through increased attention to internal organization, combining existing skills and competencies in more effective ways.
- (2) To produce process innovations and HRM practices, it is necessary to constantly monitor and have access to information about technologies and to cooperate with external business partners in the co-production process for the successful implementation of innovations. Thus, KIBS should constantly make marketing efforts to map and expand their networks that are important and create a partnership to support technological innovation that could minimize the risk and maximize the impact.
- (3) The firms could also invest in non-technological innovation with a longer-term change, like market and organizational innovation, which will have an impact on the service and process innovation in the longer-term. The small KIBS firms that are not engaged in coproducing highly specialized solutions with their client require standardized services supported by continuous organizational renewal and innovation activities (structural and HRM practices), involving staff undertaking new procedures with new operational and management processes.
- (4) Regardless of the typology of KIBS companies, an important condition is the involvement of a firm's employees in collaborative efforts to produce innovations and their ability to maintain relationships from experience with clients. It is necessary to produce organizational innovations that will enable KIBS to obtain and process information about clients, the problems they encounter, a solution that works for such clients from KIBS employees.
- (5) Firms could benchmark innovation and learn from larger and multinational firms with similar context and creating the demand for innovation as much as possible.

Concerning the Czech Republic context and the growing potential of KIBS innovations to the Czech economy, government's efforts to support or incentive the propensity to innovate in this area by:

- (1) Promoting improved access to qualified employees to produce internal and client-suppliers innovation and strengthen weaknesses such as the weak link between business and academia. In this area, the Czech Republic began to introduce support efforts in 2020, for example in the form of the Knowledge Transfer Partnership program, as part of the implementation of the Operational Program Enterprise and Innovation for Competitiveness 2014–2020 [51] whose general goal is to increase interactions between companies and organizations for research and dissemination of knowledge and greater opening of universities to cooperation with the business community.
- (2) Supporting the financial system not only for the R&D project, but for organizational innovations requiring access to external sources of financing as a result of more financially demanding strategies such as acquisitions or internationalization strategy.
- (3) Contribute to minimize the cost factor impact on the small service firms by facilitating better infrastructure and providing incentives for innovative small KIBS firms.
- (4) Creating the awareness of the KIBS contribution to the economy could attract different actors and foreign investors to address the challenges of demand for innovations (it could be as part of the service package within the EU operational programs and innovation policy).
- (5) Support promoting cooperation and mutual trust between industry and local small KIBS in the Czech Republic.

## 6.2. Limitations and Further Research

The research carried out on a sample that is rather small in size or the range corresponding to the lower limit of usability of some statistical tools, and the study has been conducted in a specific national context of the Czech Republic. Further, this research study excludes a closer analysis of perception and comparison with non-innovating small KIBS firms included in the surveyed sample, which was outside the scope of this work. This study also overlooked the importance of internal determinants influencing innovation decisions, especially in the SME category. Internal factors often play a crucial role in entrepreneurial activities, which are embodied in the owners, CEOs, and small business managers themselves. Therefore, other factors, such as the owners' awareness or ability to take the risk, should be the focus of attention. Additionally, the relationship between the external financing approach and organizational innovations, which could be further explored, is not entirely clear. It would be interesting to find out whether organizational innovations requiring access to external sources of financing are the result of more financially demanding strategies in the form of acquisitions, joint ventures, and other more capital-intensive forms (e.g., entry into foreign markets). The research does not include a sample of start-ups or very young companies in the market (up to 5 years) whose needs could be more focused on the need for seed and venture financial capital.

It should be noted that the research was conducted in the pre-crisis period of the Covid-19. Many KIBS are likely to face serious difficulties, especially if they will continue with traditional strategies and business models after the crisis period. Recently, an interesting reflection on the behavior of KIBS companies during and after Covid-19 proposed by Miles [52] points to possible directions for change in this area. KIBS must realize that their clients face similar impacts and that new and additional services are likely to be required that can help ensure immediate continuity or degradation of their operations provided by computerized KIBS and consulting companies with a special focus on IT system recovery [53]. Many KIBS firms that include predominantly B2B segments with physical contact and proximity will need to digitize their business models. KIBS in areas such as marketing can be triggered to allow clients to communicate with customers and stakeholders who require an explanation of such things as delays and difficulties in accessing client services [52]. There are likely to be opportunities for new services and possibly new markets, and there will be constant pressure to adapt to new ways of working, production, and delivery processes. It would therefore be interesting



to compare the pre-crisis and post-crisis results in terms of KIBS's innovative flexibility and their new perceptions of determinants.

**Author Contributions:** V.B. and F.M. contributed equally to this paper. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

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